LABOR AND MATERIAL COSTS AND MACHINERY INVESTMENT IN APPLE GRADING AND PACKING, 30 OHIO APPLE GROWERS, 1954-1955

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FOREWORD

Beginning with the 1954 apple crop, a study was started to determine ways of increasing the efficiency of marketing apples under Ohio conditions. The areas of study under way include packaging costs at various levels in the marketing channel and under different scales of operation, comparison of labor and material costs under different methods and an appraisal of marketing systems in use or possible under Ohio conditions.

This is the first of a series of reports to be made from this study.

SUMMARY

1. The average cost for grading apples was 10 cents per bushel.

2. The labor cost of packing a bushel of apples was 8.5 cents for bushel baskets, five cents for cardboard cartons, 18.1 cents for packing five pound bags, 18.4 cents for packing four pound bags and 21 cents for packing three pound bags.

3. Four common methods of prepackaging are: (1) packing from table, (2) packing from basket, (3) packing from grading machines, and (4) automatic bagging machine. The cost of labor for prepackaging a bushel of apples by each of these methods was 18.9 cents, 19.7 cents, 16.6 cents and 19.6 cents respectively.

4. Twenty-three growers paid an average hourly rate of 85 cents for labor while five growers paid piece work rates ranging from 1.25 cents to two cents per bag for prepackaging. The cost per bushel was 19.2 cents for those paying an hourly wage and 16.2 cents for those paying by piece work. The packaging output per hour was 77 bags for those on piece work and 47 bags per hour for those on hourly wages.

5. The average net cost of cardboard cartons used for master containers was 21.4 cents if no carton returns were made and 18 cents where some of the cartons were returned. Eleven of the growers who delivered their prepackaged apples directly to retail stores were using field crates, eastern crates, used apple boxes, etc., for master containers. The net cost of these containers was about five cents per trip.

6. The cost of bushel baskets for packing bushel units was 35.5 cents where no basket returns were made but where growers got some of

their baskets back this cost averaged 20.3 cents. The cost of cardboard cartons for packing bushel units was 33.5 cents if no carton returns were made, and 23 cents where returns were made.

7. The cost of film bags for prepackaging a bushel of apples was 17.5 cents for three pound bags, 15 cents for four pound bags and 12.4 cents for five pound bags.

8. The most common method of fastening film bags was the twistem which cost 70 cents per thousand. Other methods being used were metal clamps which averaged $2.33 per thousand, tape at 44 cents per thousand, and staples at 55 cents per thousand.

9. The cost of labels for prepackaging averaged $2.00 per thousand. There was considerable variation in price depending largely upon fanciness of label.

10. The total cost of materials and labor for packing bushel units of apples in cardboard cartons of which a portion were returned was 38 cents. It cost an additional 21 cents to pack five pound bags, 26 cents more for four pound bags and 32 cents more for three pound bags when reusable cardboard cartons were used. The cost of packing bushel baskets when a portion of them were returned was 39 cents.

11. Growers spent three times as long per bushel delivering to retail stores as to retail warehouses. It took less than one and one-half minutes per bushel to deliver to retail warehouses as compared to over four minutes per bushel for those delivering to retail stores.

12. The average machinery investment per harvested bushel was 15 cents, ranging from 22 cents per bushel for those harvesting less than 10,000 bushel to 10 cents for those harvesting over 30,000 bushel.

DISCUSSION

Variations among packers in labor costs suggest possibilities of increased efficiencies in packing both bulk and consumer units. The experiences of these growers also show wide variations in master container costs depending on the degree to which the practice of reusing them is followed. Savings in this area would appear even larger and more readily obtained in many instances than would efficiencies in grading and packing. Still another area where the variations were significant was the delivery time required. Where there are other uses for labor the use of excessive time in making deliveries might be questioned. However, only the individual concerned is able to figure whether he can get more for his time by spending an extra four minutes or more per bushel in delivery than in making some other use of it.

It is hoped that these averages of labor used in grading, packing and delivery of apples and equipment investment will serve as a standard of comparison to growers marketing apples. Further study is underway to determine more efficient ways of performing the grading, packaging and related marketing operations.

INTRODUCTION

This is a preliminary summary of one phase of a study aimed at increasing efficiencies in the marketing of apples. This phase is largely a survey of existing operations to determine the costs and methods of marketing Ohio apples with primary emphasis on packaging operations — both bushel units and consumer packages.

Records were obtained from 30 growers who prepacked at least a portion of their fruit in consumer size units, with a large number also packing bushel units.

SCALE OF OPERATIONS

The total production of the 30 growers was over 500,000 bushels for both the 1953-1954 and the 1954-1955 seasons. Of the total production in 1953-1954, approximately 40 percent or 200,000 bushels were prepacked in three, four, and five pound film bags. Over 2,000,000 bags were packed by 30 growers.

Approximately 75,000 bushels were packed in bushel units for sale away from the farm. About 35,000 bushels were made into cider and the remainder of the crop was sold at the farm in open packs, in the customer's container, to processors, to truckers, to farmers' markets, and to numerous other outlets.

A complete breakdown of the units sold away from the farm by size of pack used by the 30 growers is shown in Table 1.

GRADING AND PACKING COSTS

A. Bushel Units - The average labor cost of grading a bushel of apples was 10 cents per graded bushel (Table 2).[1/] The range was from 7.5 cents to 12.5 cents per bushel. This cost was used for all apples graded for packing in bushel units. The packing cost varied depending on the type of container used.

It cost the seven growers packing bushel baskets 8.5 cents per bushel for labor, or a total of 18.5 cents per bushel for grading and packing bushel baskets. The range in packing costs was from 6.5 cents to 10.5 cents per bushel.

The other most common method of packing bushel units was the cardboard carton. This method of packing cost five cents per bushel for labor

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1/ All cost figures (unless otherwise indicated) in this report are simple averages of the labor and material costs of the 30 growers.

or 3.5 cents less than bushel baskets. The range in packing costs was from four to six cents per bushel.

Other bushel units were packed in open field crates or eastern crates for direct delivery to retail stores or in half-bushel units, peck baskets or special type containers. The added cost of packing in open field crates or eastern crates was only slightly higher than the actual grading cost. The other methods, packing in half bushel and special type containers, cost slightly more than the 8.5 cents for bushel basket operation.

B. Prepackaged Units - The most common size consumer package being packed was the four pound transparent film bag. The average labor cost for the 16 growers grading and packing this package was 28.8 cents per bushel (10 bag master container).

Grading costs were about the same as for bushel units or 9.8 cents per bushel with the packing costs being 18.4 cents per bushel.

Seven growers were packing five pound consumer packages at a labor cost for packing of 18.1 cents per bushel and a total grading and packaging cost of 28.2 cents -- about the same for packing four pound bags.

It cost slightly over 31 cents for labor per bushel to pack three pound bags of which 21 cents was for packing and 10 cents for grading.

Labor costs for packing alone were 10 cents to 15 cents higher per bushel for packing consumer packages than for packing bushel units.

TYPE OF PREPACKAGING OPERATION

The prepackaging operations were divided into four methods. These were: (1) packing off a table by hand, (2) packing directly from baskets or crates by hand, (3) packing directly from the mechanical graders by

TABLE 1: NUMBER OF UNITS PACKED, BY SIZE OF PACK, OHIO, 1953-1954

Package	Number of Units Packed	Total Bushels
	(number)	(bushels)
Prepackaged Units		
Three pound bags*	940,500	72,350
Four pound bags**	1,095,100	109,510
Five pound bags***	64,000	8,000
Bushel Units		
Bushel baskets	37,000	37,000
Cardboard cartons	21,500	21,500
Eastern crates	12,000	12,000
Half bushel baskets	7,000	7,000

*13 per bushel **10 per bushel ***8 per bushel

TABLE 2: PER BUSHEL PACKING COST OF OHIO APPLES, BY TYPE OF UNIT, 1954-1955

Size of Container	Number of Growers	Grading Cost	Packing Cost	Total
		(cents)	(cents)	(cents)
Bushel Basket	7	10.0¢	8.5¢	18.5¢
Cardboard Carton	7	10.0	5.0	15.0
13-Three Pound Bags	5	10.1	21.1	31.2
10-Four Pound Bags	16	9.8	18.4	28.2
8-Five Pound Bags	7	9.8	18.1	27.9

hand (especially at harvest time), and (4) automatic bagging machine (Table 3).

The most common method was packing off of a table. The apples were graded and a number of bushels were dumped onto a table from which the packaging was done. The average cost of labor per bag (all sizes) and per bushel for this method was two cents and 18.9 cents respectively.

The second most common method was that of packing directly out of a

basket, field crate, or similar container. The apples were graded into the containers and immediately packaged from the container or else put into storage for later packaging. The average cost for the 9 growers packaging by this method was 2.1 cents per bag (all sizes) and 19.7 cents per bushel.

A common method of packaging in the fall or early winter was that of packing directly from the mechanical grader. There were two types of this operation, one being continuous with sufficient packers to keep up with the mechanical grader and the other method was one where the graders also did the packaging. In this latter type of operation, the grading machine was operated until the packing bin or table was filled with apples and then shut down while the workers packed the apples in the bin. The labor cost of prepackaging directly from the grading machine was 1.6 cents per bag and 16.6 cents per bushel. One of the growers who packed directly from the grading machine used a return-flow belt on which the apples came off of the grader and were packed from the belt.

The fourth method of prepacking studied was the automatic bagging machine which was used by two growers. The labor cost of prepackaging

TABLE 3: NUMBER OF GROWERS AND COST OF LABOR PER PACKAGE AND PER BUSHEL, BY TYPE OF OPERATION, OHIO, 1954-1955

Type of Operation	Number of Growers	Cost of Labor Per Bag	Cost of Labor Per Bushel	Range in Labor Cost Per Bushel
		(cents)	(cents)	(cents)
Packing from Table	10	2.0¢	18.9¢	12.5¢ to 26.4¢
Packing out of Bushel Containers	9	2.1	19.7	16.0 to 30.0
Packing from Grader	7	1.6	16.6	12.0 to 24.0
Bagging Machine	2	1.7	19.6	17.0 to 22.3
Total and Average	28	1.9¢	18.7¢	12.0¢ to 30.0¢

by this method was 1.7 cents per bag and 19.6 cents per bushel.

Many of the growers used more than one method of prepackaging, depending on the existing labor force, the time of year, or the amount to be packaged. For illustration, some growers who pack directly from the grader in the fall may pack from a table or basket in late winter.

There are advantages and disadvantages in each of the various methods of prepackaging. Packing directly from the grading machine eliminates the additional handling required for the other methods. However, this method is not feasible in late winter for those growers who grade all of their apples before putting in storage.

Packing directly out of a bushel container is very flexible and can be done most any place and in any amount. It has the disadvantage of a small area to package from and only a small amount of fruit in sight at one time. If a certain size apple is needed it may not be in sight.

Packing from a table gives a larger surface to package from. However, the apples have to be dumped from the container to the table. This requires one more handling and is one more possibility for bruising.

The main advantage of machine packaging is the fact that greater volume per hour is possible with the machine. The labor cost of packing by machine was no less than packing by hand.

Packing off the grader (continuous operation) and machine packing favor the grower with large production while packing from table and from bushel containers are in more general use by the smaller producer. There are, however, growers with considerable volume packing from tables or from bushel containers.

PIECE WORK VS. HOURLY LABOR FOR PREPACKAGING

The most common method of paying workers for packing apples into film bags was by the hour. Twenty-three of the twenty-eight growers

paid an hourly wage (Table 4). The other five growers paid on a piece work basis ranging from 1.25 cents to two cents per bag regardless of size. The average cost per package for the hourly rate growers was about 1.9 cents per bag and 19.2 cents per bushel as contrasted to 1.7 cents per package and 16.2 cents per bushel for those who paid a piece work rate.

TABLE 4: COMPARISON OF PIECE WORK AND HOURLY WAGE AS METHODS OF PAYMENT FOR PREPACKAGING OHIO APPLES, 1954-1955

Method of Payment	Number of Growers	Labor Cost Per Bag	Labor Cost Per Bushel	Average Earnings Per Hour	Average Output Per Hour
		(cents)	(cents)	(dollars)	(bags)
Hourly Basis	23	1.94¢	19.2¢	$ .84	47
Piece Work	5	1.70	16.2	1.20	77
Total and Average	28	1.89¢	18.6¢	$ .91	52

Not only was the cost per bag lower in the group of growers paying on the piece work basis but the output per man hour was much higher. The average output per packer on piece work was 77 bags per hour as contrasted to 47 bags per hour for those on hourly wage.

The average hourly earnings were also considerably higher among the piece work group, averaging $1.20 per hour as contrasted to about 85 cents per hour for those on hourly wage.

There are two main disadvantages of packing apples on a piece work basis. One of these is the possibility of overlooking bad apples in packing and failing to throw them out due to emphasis on speed. The possibility also exists of greater bruising taking place in the case of piece work where the worker is less inclined to be careful in putting apples

in the bag. However, paying on an hourly basis does not preclude both of these circumstances from occuring.

MATERIAL COST

A. Bushel Container Cost - Eleven of the growers used bushel baskets to pack some of their bulk fruit in. The average new cost of these baskets was 35.5 cents. However, seven growers attempted to get their baskets back and were on the average able to get about half of them returned at a cost ranging from five to 10 cents. Thus they were able to reduce the net cost per trip to 20.3 cents for containers.

Eight of the growers used cardboard cartons for packing a portion of their fruit. The new cost of these was 33.5 cents. Three of the growers, however, were able to get back about one-third of their cartons thereby reducing the per trip cost to about 23 cents.

Eastern crates were used by five of the growers who delivered bulk fruit directly to retail stores. The initial cost of these containers was about 54 cents but practically all of them were returned each time thereby reducing the per trip cost to about five cents.

The average bushel container net cost for all three types was about 21 cents as compared to about 39 cents for new cost.

B. Master Container Cost - The most common master container used for prepackaged apples was a cardboard carton, with 16 of the growers using this type of container (Table 5). Nine of the growers attempted to get their cartons back and on the average, about two-fifths of all cartons were returned. The new cost of these containers was 24.3 cents but the net cost per container was 18 cents. The average new and net cost of the cartons of the group of growers not getting any carton returns was 21.4 cents.

TABLE 5: COST OF CONTAINERS FOR BUSHEL AND FOR PREPACKAGED UNITS, OHIO, 1954-1955

Type	Number Using	Original Cost	Percentage Returned	Cost of Return	Net Cost Per Trip
		(cents)	(percent)	(cents)	(cents)
A. Master Containers					
1. Cardboard Carton (reused)	9	24.3¢	39%	4.2¢	17.9¢
2. Cardboard Carton (used only once)	7	21.4	0	0	21.4
3. Field Crates, Eastern Crates, and Bushel Baskets	11	40.0	98	4.0	5.0
4. Orange Crates, Used Apple Boxes, Etc.	3	5.0	0	0	5.0
B. Bushel Units (Bulk)					
1. Bushel Baskets (reused)	7	35.5	51	6.0	20.3
2. Bushel Baskets (used only once)	4	35.5	0	0	35.5
3. Cardboard Cartons (reused)	3	33.5	33	5.0	22.7
4. Cardboard Cartons (used only once)	5	33.5	0	0	33.5
5. Eastern Crates (reused)	5	53.6	98	4.0	5.0
Total and Average* -- Prepackaged Master Containers	28	26.1¢	-	-	11.3¢
Total and Average* -- Bushel Units	24	38.6¢	-	-	21.0¢

* weighted average

Eleven of the growers were using field crates, eastern crates, bushel baskets, etc., for master containers. The initial cost was much greater than for cardboard cartons, but the carton returns were much higher, being in most cases almost 100 percent. The net cost per trip was only about five cents which included repair and loss. All growers using these master containers delivered directly to retail stores and were able to get their containers back immediately or on the return trip.

The other three growers used such containers as orange crates and old apple boxes which they paid five cents for at the store or warehouse.

The average net cost of all master containers was 11.3 cents as compared to a new cost of 26 cents.

C. Bag Cost - An additional cost of prepackaging is the use of the individual consumer bag (Table 6). However, the cost of film bags has dropped 50 percent in the last three or four years. The average cost per thousand bags for the three sizes of bags was $13.50 for three pound, $14.98 for four pound, and $15.63 for five pound. In terms of bushel costs of packaging bags, it cost about 17.5 cents for three pound bags (13 bags), 15 cents for four pound bags (10 bags), and 12.5 cents for five pound bags (8 bags).

TABLE 6: COST OF FILM BAGS, BY SIZE OF BAG
OHIO, 1954-1955

Size Bag	Number Using	Average Price Per Thousand	Range in Price Per Thousand	Cost Per Bushel
		(dollars)	(dollars)	(cents)
Three pound	7	$13.50	$12.50 to $15.50	17.5¢
Four pound	18	14.98	13.50 to 16.85	15.0
Five pound	6	15.63	14.65 to 17.50	12.4
Five pound printed	1	28.00	28.00	22.4
Total and Average	32*	$15.18**	$12.50 to $28.00	15.0¢**

* Some growers using more than one size bag
** Does not include printed bag

D. Fastener Costs - The most common method of fastening bags was the twistem (Table 7). Over two-thirds of the growers were using this type of closure at an average cost of 70 cents per thousand. Six growers used a metal clamp of some type. These were more expensive, at an average cost of $2.33 per thousand. Two growers were using tape and two were using staples. The average cost for the tape was 44 cents per thousand bags and for the staples 55 cents per thousand. This does not

include the initial cost of the tape machine or the cost of the stapler.

TABLE 7: COST OF BAG CLOSURE, BY METHOD OF CLOSURE, OHIO, 1954-1955

Type of Closure	Number Using	Average Cost (per thousand)	Range in Cost (dollars)
Twistem	20	$ .70	$ .67 to $ .80
Metal Clamp	6	2.33	1.75 to 2.75
Tape	2	.44	.40 to .48
Staples	2	.55	.55
Total and Average	28	$1.00	$ .40 to $2.75

E. Lable Cost - Another cost of prepackaging is the label or ticket which the state law requires unless the bag is printed with the necessary information. The average cost of labels was slightly over $2.00 per thousand. Prices ranged from $1.00 to $6.00 per thousand (Table 8). The cost of the label depended to a great extent upon color, fanciness, and size of lot ordered.

TABLE 8: COST OF LABEL FOR USE IN CONSUMER PACKAGES, OHIO, 1954-1955

Cost Per Thousand (dollars)	Number of Growers
$1.00 to $2.00	17
2.00 to 3.00	7
3.00 to 4.00	5
4.00 to 5.00	0
5.00 to 6.00	1
Total	28

TOTAL COST OF LABOR AND MATERIAL

The total material and labor cost for packing apples in three pound bags was 74 cents if cardboard cartons that were not returned were used as master containers, 70 cents if reusable cartons were used and 57 cents

if field crates which were returned were used (Table 9). It cost about six cents less to pack four pound packages using the same master container and 11 cents less to pack five pound packages.

It cost 49 cents in labor and materials to pack a bushel of apples in non-returnable cardboard cartons and 38 cents where part of the cartons were returned. The cost of labor and materials in packing bushel baskets was 54 cents if the baskets were not returned and 38 cents where some of the baskets were returned.

TABLE 9: TOTAL COST OF LABOR AND MATERIAL FOR PACKAGING A BUSHEL OF APPLES, BY VARIOUS METHODS, OHIO, 1954-1955

Cost Item	Consumer Unit			Bushel Unit	
	Three Pound Package	Four Pound Package	Five Pound Package	Bushel Basket	Cardboard Carton
	(cents)	(cents)	(cents)	(cents)	(cents)
A. Labor					
1. Grading	10.1¢	9.8¢	9.8¢	10.0¢	10.0¢
2. Packing	21.1	18.4	18.1	8.5	5.0
B. Material					
1. Bags	17.5	15.0	12.0		
2. Fasteners	1.0	.8	.6		
3. Label	2.6	2.0	1.6		
4. Cardboard Carton 1/	17.9	17.9	17.9		22.7
5. Cardboard Carton 2/	21.4	21.4	21.4		33.5
6. Bushel Basket 1/				20.3	
7. Bushel Basket 2/				35.5	
8. Field Crates and Other 1/	5.0	5.0	5.0		
C. Total Cost					
1. Cardboard Carton 1/	70.2¢	63.9¢	59.0¢		37.7¢
2. Cardboard Carton 2/	73.7¢	67.4¢	63.5¢		48.5¢
3. Bushel Basket 1/				38.8¢	
4. Bushel Basket 2/				54.0¢	
5. Field Crates and Other 1/	57.3¢	51.0¢	46.0¢		

1/ Reused
2/ Used only once

DISTRIBUTION

Seventeen of the 30 growers delivered their prepackaged fruit directly to retail stores (Table 10). It took almost five hours to deliver an average size load of 70 bushels or 4.1 minutes per bushel. Eleven of the growers delivered to retail warehouses. The delivery time was four and one-fourth hours or just about one-hlaf hour less than for delivering directly to retail stores. However, the average size load was almost 200 bushels or about three times the average load delivered to retail stores. The time required per bushel for those delivering to warehouses was only 1.3 minutes. Two of the packers sold their prepacked fruit wholesale but it was picked up at their own storage.

The average size load for grower delivery of bushel units to retail stores was 71 bushels which required five hours for delivery or 4.2 minutes per bushel (Table 11). Six of the growers delivered an average size load of 218 bushel units to retail warehouses in five hours. The time required per bushel was 1.4 minutes. Five growers sold their apples packed in bushel units wholesale. The delivery time in this case was just under one minute per bushel.

TABLE 10: DISTRIBUTION OF PREPACKAGED APPLES, BY TYPE OF OUTLET, OHIO, 1954-1955

Type of Outlet	Number of Growers	Load		Delivery Time		
		Average Size	Range in Size	Average	Range	Minutes Per Bushel
		(bushel)	(bushel)	(hours)	(hours)	(minutes)
Retail Store	17	70	5 to 250	4 3/4	1 to 13	4.1
Retail Chain Warehouse	11	196	100 to 270	4 1/4	3 to 9	1.3
Wholesale	2	182	125 to 240	0*	0*	0
Total and Average	30	124	5 to 270	4 1/2	0 to 13	2.1

* Picked up at packing house

TABLE 11: DISTRIBUTION OF APPLES IN BUSHEL UNITS, BY TYPE OF OUTLET, OHIO, 1954-1955

Type of Outlet	Number of Growers	Load		Delivery Time		
		Average Size	Range in Size	Average	Range	Minutes Per Bushel
		(bushel)	(bushel)	(hours)	(hours)	(minutes)
Retail Store	5	71	20 to 100	5	2 to 8	4.2
Retail Chain Warehouse	6	218	75 to 250	5	2 to 9	1.4
Wholesale	5	175	50 to 225	2 3/4	0 to 3 1/2	.9
Total and Average	16	159	20 to 250	4 1/4	0 to 9	1.6

GRADING AND PACKAGING MACHINERY INVESTMENT 1/

The average investment of the growers from whom records were obtained was $2700 (Table 12). There was considerable variation of investment depending to a great extent on the size of the enterprise. The average investment of the growers who had production of less than 10,000 bushels was $1300 as compared to an average investment of $5000 for those producing over 30,000. However, the investment per harvested bushel was much higher in the group having smaller production. The investment per harvested bushel was 22 cents as compared with 10 cents per bushel in the case of those producing over 30,000 or more bushels.

Two-thirds of the growers had an investment in equipment of less than $2000 while only five had an investment of more than $5000 (Table 13).

Very little additional equipment is needed for prepackaging. The only absolutely necessary equipment is a set of scales. These can be either the over and under type or actual weight scales. Seventeen of the growers had equipment investment of less than $50 which was used solely for prepackaging (Table 14). Only six of the growers had investments of

1/ This includes such machinery as grader and sizer, scales, conveyers, dollies, pallets, etc. -- machinery directly involved in grading and packaging.

$100 or more which were used only for prepackaging.

TABLE 12: MACHINERY INVESTMENT OF OHIO APPLE GROWERS, BY PRODUCTION GROUP, 1954-1955

Production Group	Number of Growers	Average Production	Average Equipment Investment	Investment Per Harvested Bushel
(bushels)		(bushels)	(dollars)	(cents)
Under 10,000	12	6,000	$1,300	22¢
10,000 to 19,000	8	13,900	1,900	14
20,000 to 29,000	5	22,900	3,600	16
30,000 and over	5	48,200	5,000	10
Total and Average	30	18,000	$2,700	15¢

TABLE 13: MACHINERY INVESTMENT OF OHIO APPLE GROWERS, BY COST PER HARVESTED BUSHEL, 1954-1955

Cost Per Harvested Bushel	Number of Growers	Average Production	Average Investment
		(bushels)	(dollars)
Under 10¢	4	40,000	$2,900
10¢ to 19¢	12	20,000	2,700
20¢ to 29¢	11	10,600	2,450
Over 30¢	3	7,500	3,000
Total and Average	30	18,000	$2,700

TABLE 14: MACHINERY INVESTMENT OF EQUIPMENT USED SOLELY FOR PREPACKAGING, OHIO, 1954-1955

Size of Investment	Number of Growers	Average Bushel Prepackaged
		(bushels)
Under $50	17	3,000
$50 to $100	7	18,000
$100 to $200	3	9,000
$500 and over	3	12,000
Total and Average	30	7,700

EFFECT OF SIZE OF OPERATION ON PACKING COST

The labor cost in grading and packing was not related to the size of the packaging operation. Growers with small volume had about the same labor costs as did the growers with large volume (Table 15). The same relationship held for the several size consumer packages and bushel units.

TABLE 15: RANGE IN COST OF PREPACKAGING BY VOLUME PREPACKAGED, 1954

Number of Bushels Prepackaged	Cost of Packing Per Bushel		
	Three Pound	Four Pound	Five Pound
	(cents)	(cents)	(cents)
Under 2,500	16.0¢ 24.9	14.5¢ 15.0 17.0 20.0 25.0	14.0¢ 16.0 24.0
2,500 to 10,000	16.7	12.5 15.0 16.0 20.0 20.0	12.0 18.0
10,000 and over	22.4 25.3	12.5 14.0 15.0 20.0 24.0 30.0	16.0 26.4

However, the smaller growers tended to have larger machinery investments per harvested bushel and spent more time per bushel in delivering the packed apples. The growers with large volumes had a more nearly continuous operation than the growers with small volume thereby reducing the cost per bushel of such overhead costs as building, managerial expense, etc. Thus, if the total costs of packing and marketing apples

were considered, the cost per unit would be slightly less for the large operation than for the small operation. No dollar per unit reduction can be described from the available data.

More important than the size of the packing operation in affecting labor costs were the methods of prepackaging, skill of prepacker, and the method of paying the worker (piece rate or hourly).